Homework 7

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1.

H_0 : Barking Deer do not prefer one habitat over the other when foraging

H_a : Barking Deer do not prefer one habitat over the other when foraging

```
obs_counts <- c(4, 16, 61, 345)
probs <- c(0.048, 0.147, 0.396, 0.409)
expected <- sum(obs_counts) * probs
```

If H_0 is true, we would expect the following counts:

Woods	Cultivated grassplot	Deciduous forests	Other
20.448	62.622	168.696	174.234

```
t <- chisq.test(obs_counts, p = probs)
t
```

```
    Chi-squared test for given probabilities

data:  obs_counts
X-squared = 284.06, df = 3, p-value < 2.2e-16
```

Our test statistic χ^2 is 284.0609495 and our p-value is $2.7997242 \times 10^{-61}$ (essentially zero).

Because our p-value is smaller than α, we reject the null hypothesis and have evidence to conclude that Barking Deer prefer certain habitats over other habitats when foraging.

2.

```
source("https://www.openintro.org/data/R/env_regulation.R")
```

Regulations necessary	Private marketplaces will ensure	Don't know
45%	45%	10%

H_0 : The proportions in each group concerning gov't regulations correspond to the above proportions

H_a : The proportions in each group concerning gov't regulations do not correspond to the above proportions

```
obs_counts <- table(env_regulation)
probs <- c(0.1, 0.45, 0.45)
t <- chisq.test(obs_counts, p = probs)
t
```

```
    Chi-squared test for given probabilities

data:  obs_counts
X-squared = 23.438, df = 2, p-value = 8.137e-06
```

The p-value is much below our α, so we reject the null hypothesis. We have evidence to show that the true proportions of people in each group does not correspond with our belief of the proportions that should fall into each group.

3.

H_0 : Party affiliation is independent of opinion of use of x-ray scanners

H_a : Party affiliation is associated with opinion of use of x-ray scanners

```
obs <- c(264, 38, 16, 299, 55, 15, 351, 77, 22)
obs_counts <- matrix(obs, nrow = 3, ncol = 3)
t <- chisq.test(obs_counts)
t
```

```
    Pearson's Chi-squared test

data:  obs_counts
X-squared = 4.3576, df = 4, p-value = 0.3598
```

Our test statistic is 4.3575657 and our p-value is 0.3597721. The p-value is above α, so we do not reject the null. We do not have evidence to suggest that party affiliation is associated with their opinion on the use of x-ray scanners.

```
t$expected
```

```
          [,1]      [,2]      [,3]
[1,] 255.63061 296.62797 361.74142
[2,]  47.54617  55.17150  67.28232
[3,]  14.82322  17.20053  20.97625
```

The smallest expected value is 17.2, which is above 5 so our conditions are met. Our samples are also random and independent.

4.

```
source("https://www.openintro.org/data/R/global_warming_pew.R")
```

H_0 : Party ideology and reponse to question on global warming are independent

H_a : Party ideology and response to question on global warming are associated

```
obs <- table(global_warming_pew)
```

```
t <- chisq.test(obs)
t
```

```
    Pearson's Chi-squared test

data:  obs
X-squared = 507.52, df = 6, p-value < 2.2e-16
```

The p-value is far below α, so we reject the null hypothesis. We have evidence to suggest that party ideology and their response to the question on global warming are associated.

5.

H_0: Proportion of Americans who said govt shutdown affected them is not associated with making more or less than 40,000

H_a: Proportion of Americans who said govt shutdown affected them is associated with making more or less than 40,000

```
obs <- c(100,109,223,182)
obs_matrix <- matrix(obs, nrow = 2, ncol = 2)
chisq.test(obs_matrix)
```

```
    Pearson's Chi-squared test with Yates' continuity correction

data:  obs_matrix
X-squared = 2.5961, df = 1, p-value = 0.1071
```

Our p-value is more than 0.05, so we do not reject the null hypothesis. We do not have evidence to suggest that the proportion of Americans who said government shutdown affected them is associated with making more or less than 40,000.